

Fire Standards

*in the
International
Marketplace*

*Arthur F. Grand
editor*



STP 1163

STP 1163

Fire Standards in the International Marketplace

Arthur F. Grand, editor

ASTM Publication Code Number (PCN)
04-011630-31



ASTM
1916 Race Street
Philadelphia, PA 19103
Printed in the U.S.A.

Library of Congress Cataloging-in-Publication Data

Fire standards in the international marketplace / Arthur F. Grand,
editor.

p. cm.—(STP ; 1163)

“ASTM publication code number (PCN): 04-011630-31.”

Includes bibliographical references and index.

ISBN 0-8031-2005-2

1. Fire prevention—Standards—Congresses. I. Grand, Arthur F.

II. Series: ASTM special technical publication ; 1163.

TH9112.F56292 1995

628.9'22'0218—dc20

95-24584

CIP

Copyright © 1995 AMERICAN SOCIETY FOR TESTING AND MATERIALS, Philadelphia, PA.
All rights reserved. This material may not be reproduced or copied, in whole or in part, in any
printed, mechanical, electronic, film, or other distribution and storage media, without the written
consent of the publisher.

Photocopy Rights

Authorization to photocopy items for internal or personal use, or the internal or personal use
of specific clients, is granted by the AMERICAN SOCIETY FOR TESTING AND MATERIALS for
users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service,
provided that the base fee of \$2.50 per copy, plus \$0.50 per page is paid directly to CCC, 222
Rosewood Dr., Danvers, MA 01923; Phone: (508) 750-8400; Fax: (508) 750-4744. For those
organizations that have been granted a photocopy license by CCC, a separate system of
payment has been arranged. The fee code for users of the Transactional Reporting Service is
0-8031-2005-2/95 \$2.50 + .50.

Peer Review Policy

Each paper published in this volume was evaluated by three peer reviewers. The authors
addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and
the ASTM Committee on Publications.

To make technical information available as quickly as possible, the peer-reviewed papers in
this publication were prepared “camera-ready” as submitted by the authors.

The quality of the papers in this publication reflects not only the obvious efforts of the authors
and the technical editor(s), but also the work of these peer reviewers. The ASTM Committee
on Publications acknowledges with appreciation their dedication and contribution to time and
effort on behalf of ASTM.

Printed in Philadelphia, PA

September 1995

Foreword

This publication, *Fire Standards in the International Marketplace*, contains papers presented at the symposium of the same name held in Phoenix, AZ on 5 December 1994. The symposium was sponsored by ASTM Committee E-5 on Fire Standards. Arthur F. Grand of Omega Point Laboratories, Inc. in Elmendorf, TX presided as symposium chair and the editor of the resulting publication.

Contents

Overview

vi

TEST METHOD DEVELOPMENT

The Development and Evolution of the Cone Calorimeter: A Review of 12 Years of Research and Standardization—V. BABRAUSKAS	3
A Comparison of Three Smoke Test Methods—T. W. FRITZ AND P. L. HUNSBERGER	23
Comparison of ASTM Fire Standards with International Fire Standards for Buildings and Contents—S. J. GRAYSON AND M. M. HIRSCHLER	41

INTERNATIONAL ASPECTS OF FIRE STANDARDS

International Developments in Fire Safety Engineering—G. M. E. COOKE	63
Presentation of Parts of Eurocodes on Structural Fire Design—J. KRUPPA	72

FIRE PERFORMANCE IN THE REAL WORLD

Current Controversies in Fire Resistance Testing—J. J. BEITEL	89
Fire Resistive Joints: A History in the Making—J. D. NICHOLAS	100

Overview

This Special Technical Publication (STP), and the symposium on which it was based, were organized to help commemorate the 90th anniversary of Committee E-5 on Fire Standards that was created in 1904. For this event, papers were solicited on the topic of the Internationalization of Fire Standards because this has been a significant recent trend in fire standards development. For example, certain ASTM Fire Test Methods are similar or identical to test standards in the International Organization for Standardization (ISO) and other standards organizations around the world. The authors of the papers in this book are also international in scope, representing the United States, England, and France.

The creation of large free-trade zones, such as the European Union, have had a significant impact on how United States companies do business, how regulations are written, and how testing laboratories and research institutions operate. Furthermore, we are changing our viewpoint on the standards that are recognized and accepted for the evaluation of commercial products. Thus, the papers contained within this volume are concerned with test methods having international implications and with standards development both in the United States and in Europe.

This STP contains seven papers, dealing with the following topics:

- (1) Test Method Development,
- (2) International Aspects of Fire Standards, and
- (3) Fire Performance in the Real World.

There are many ongoing events in the international arena that are relevant to test method development. Among these are the increasing use and acceptability of a device known as the cone calorimeter (ASTM E 1354, SO 5660). Thus it seemed appropriate to begin this volume on international fire standards with a paper by Babrauskas that provides a review of the development, standardization, and future of the cone calorimeter.

Visible smoke measurements are obtainable from the cone calorimeter and from other test methods as well. However, methods for the characterization of smoke from natural and synthetic materials are plagued with a fundamental problem: smoke evaluation and measurement are dependent on the combustion scenario and on the apparatus in which the measurements are taken. Thus, different results would be expected from flaming versus nonflaming combustion, and static versus flow-through systems. Addressing this important issue, the second paper of this volume, by Fritz and Hunsberger, is a research paper that includes a comparison of results of three different smoke test methods. The three methods represent current standard test methods in both ASTM and in ISO.

Leading off a discussion on the international aspects of fire standards, appropriately, is the third paper by Grayson and Hirschler that contains a review and comparison of the ASTM and International Fire Standards on materials, products and assemblies. Many of the cited standards, which are cataloged in an easy-to-read manner, have counterparts in one or another of the ISO's standards.

Fire safety engineering is a relatively new area for standardization, but one that has received worldwide interest. Thus, a review of the progress of one particular ISO subcommittee, in the context of work ongoing in several countries, is especially pertinent to the goals of this book. Such is the topic of the fourth paper by Cooke.

"Structural Fire Design" is an aspect of the International World of Fire Standards that is often little understood outside of the realm of the design engineers. However, as a complement to the

papers dealing with standards for real-world products and for fire safety engineering, the paper by Kruppa contains a discussion of the application of structural considerations in realistic fire scenarios.

The paper on Structural Fire Design helps to bridge the gap between design and performance in the real world, which is the subject of the final two papers. Controversies regarding fire resistance testing has caught the attention of delegates to ASTM and ISO meetings for years. These issues are summarized in a paper by Beitel that also offers recommendations for a resolution of the issues.

Finally, the history, development, and future of a specific application of fire resistance testing, the evaluation of the performance of Fire Resistive Joints, is described by Nicholas. This paper deals with the interesting problem of evaluating an assembly that is both multi-component and dynamic. This contribution completes our tour through fire standards in the international marketplace.

This book provides some of the information that an individual might need in order to be knowledgeable about the complex international arena of fire standards. Years ago, it was often satisfactory for a manufacturer to comply with a single regulation citing a specific standard for acceptability of a product in the marketplace. Now, with an increased emphasis on products to be sold in world markets and an enhanced awareness of fire safety, International Fire Standards have taken on new meaning and a new sense of importance.

Arthur F. Grand, Ph.D.

Omega Point Laboratories, Inc.
Elmendorf, TX 78112
symposium chairman and editor

ISBN 0-8031-2005-2